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FREE-LIVING MARINE NEMATODES FROM KII PENINSULA. I.[1)]

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With Text-figures 1–4 and Tables 1–6

The extensive description of free-living nematodes began in the latter half of the nineteenth century from Bastian's (1865) "*Monograph on the Anguillulidae*" and others' (Bütschli 1873, 1874; Eberth 1863; de Man 1884; etc.). From 1910 to 1940 there appeared numerous records from various regions of the world (Cobb 1920; de Coninck 1935; Ditlevsen 1918, 1930; Filipjev 1918–1921; Micoletzky 1930; Schuurmans-Stekhoven 1935; Steiner 1915, 1931; etc.). Wieser's (1953–59) works on Chilean nematodes marked the beginning of the modern science of free-living marine nematodes. Recently "*The Bremerhaven checklist of aquatic nematodes*" (Gerlach & Riemann 1973–74) was published and the taxonomical studies of marine nematodes have been a great deal facilitated.

In 1926, four species of marine nematodes were described by Steiner and Höppli for the first time from Japan. Unfortunately, however, after Wieser's (1955) basic work on Japanese nematode fauna, only few works had been done until Kito (1976, 1977) began to describe the free-living nematodes from Hokkaido (Tokioka 1949; Allgén 1951; Sudzuki 1976). Therefore, less than 40 species have been known from Japan. 21 of them belong to the order Chromadorida and 10 species (*Leptosomatum abyssale* from the Sagami Sea (Allgén 1951); *Syringolaimus striacaudatus*, *Oncholaimus dujardini*, *Viscosia carnleyensis*, *Eurystomina ophthalmophora*, *Polygastrophora tenuicollis*, *Halalaimus sp.*, *Enoplus sp.* 1, *Enoplus sp.* 2 from Shirahama (Wieser 1955) and *Enoplus anisospiculus* from Hokkaido (Kito 1976)) to Enoplida, although the species of Enoplida are large and easily found as interstitial or epiphytic animals.

The present paper is the first report of the author's serial works on free-living marine nematodes from Kii Peninsula, and deals with four species of the order Enoplida, all of them are new to Japan and one new to science. Specimens were collected from the coastal areas of Tanabe Bay and around Shirahama, southern west of Kii Peninsula, by weed-washing or decanting-sieving method. They were preserved in 5% formaline, and mounted in glycerine. All measurements are in millimeters, except otherwise stated.

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Abbreviations for Tables

L; body length. **eso**; oesophagus length. **hd**; head diameter at the level of cephalic setae. **bd**; body diameter at the base of oesophagus. **ad**; anal diameter (females) or cloacal diameter (males). **vd**; vulval diameter. **mbd**; maximal body diameter of males. **cs**; length of longer cephalic setae. **mandl**; length of madibles. **am**; distance from anterior end to amphids. **cerv. 1, 2, 3** and **4** ;distance from anterior end to the first, second, thrid and fourth lateral cervical setae. **nr, ep**; distance from anterior end to nerve ring and excretory pore. **t**; tail length. **spic**; spicule length. **gub**; gubernaculum length. **sup**; length of pre-cloacal supplement. **s, c**; distance from cloacal opening to supplement. **V**; distance from anterior end to vulva. **a, b, c, Vu**; de Man's ratio.

Family Ironidae

Thalassironus britannicus De Man, 1889

(Fig. 1)

Specimens Examined. 4 males and 2 females from Hatake-jima Isl., Tanabe Bay; fine sand of lower littoral zone.

Description. Measurements are shown in Table 1.

Body long. Cuticle smooth and no striation visible. Buccal cavity long and tubular with typical one double dorsal and two single subventral teeth. Eight pairs of cervical setae present; three pairs on each lateral side and one on each median side. The median pairs on a level with the third lateral pairs. Amphids pocket-like. Oesophagus cylindrical, slightly broadened in the posterior region. Nerve ring at about 40% of oesophagus length from anterior end. Excretory pore inconspicuous. Tail short and conical, with paired terminal setae. Spicule stout and cephalated proximally. Gubernaculum paired and with distal cup-shaped swelling. Males with a single median pre-cloacal papilla. Ovaries paired, equal, opposed and reflexed at about 20% of body length anterior and posterior to vulva respectively. Eggs elongate, 88–93 × 281–296 μm.

Diagnostic Characters. One double dorsal and two single subventral teeth. Gubernaculum with cup-shaped swelling. Three pairs of lateral cervical setae.

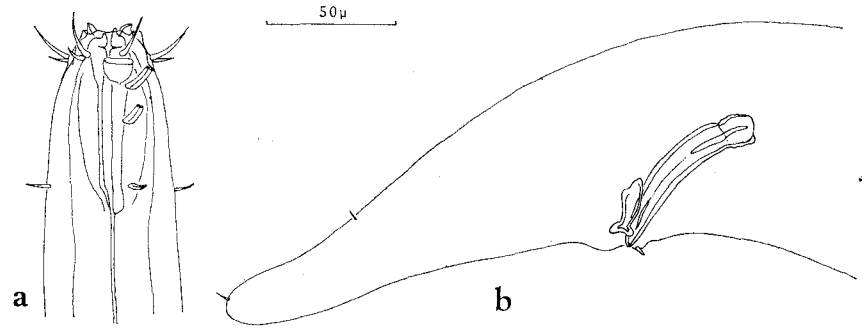

Fig. 1. *Thalassironus britannicus* de Man, 1889. Specimen from Hatake-jima. a: Head of male. b: Tail of male.

Table 1. Measurements of *Thalassironus britannicus*

	♂1	♂2	♂3	♂4	♀1	♀2
L	5.90	6.62	6.84	7.12	6.16	6.49
eso	.551	.615	.609	.678	.603	.609
hd	.031	.033	.030	.035	.032	.031
bd	.078	.088	.092	.080	.090	.082
ad	.060	.061	.061	.077	.063	.067
vd					.081	.089
mbd	.085	.097	.103	.104		
cs	.021	.024	.022	.022	.023	.019
cerv. 1	.025	.024	.027	.024	.020	.023
cerv. 2	.037	.035	.036	.036	.030	.033
cerv. 3	.063	.061	.055	.062	.056	.059
nr	.260	.251		.254	.251	.233
t	.145	.160	.166	.163	.170	.170
spic	.068	.072	.068	.070		
gub	.026	.029	.029	.028		
V					3.92	4.03
a	69.4	68.3	66.4	68.4	68.5	72.9
b	10.7	10.7	11.2	10.5	10.2	10.7
c	40.7	41.4	41.2	43.7	36.3	38.2
Vu (%)					63.5	62.1

Distribution. English Channel (de Man 1889); Irish coast of Atlantic (Southern 1914); Isles of Scilly (Warwick 1977); Tanabe Bay.

Remarks. The present specimens have the typical cervial setae. Other characters also well agree with the descriptions by de Man (1889) and Warwick (1977), although the tails are rather shorter; de Man's ratio c more than 40 in males, while that is 35.5 according to de Man (1889).

Family Anticomidae

On the Genus Anticoma. Wieser & Hopper (1967) distinguished two groups of *Anticoma* species by the position of excretory pore and the length of terminal excretory duct: (A) *Anticoma* with excretory pore between posterior cervical setae and nerve ring and with short terminal excretory duct; (B) with excretory pore on a level with or in front of cervical setae and long terminal excretory duct. Two species of *Anticoma* described in the following pages belong to group (A) and (B) respectively.

Anticoma trichura Cobb, 1898

(Fig. 2)

Specimens Examined. 3 males and 2 females from Hatake-jima Isl., Tanabe Bay; fine sand exposed at low tide.

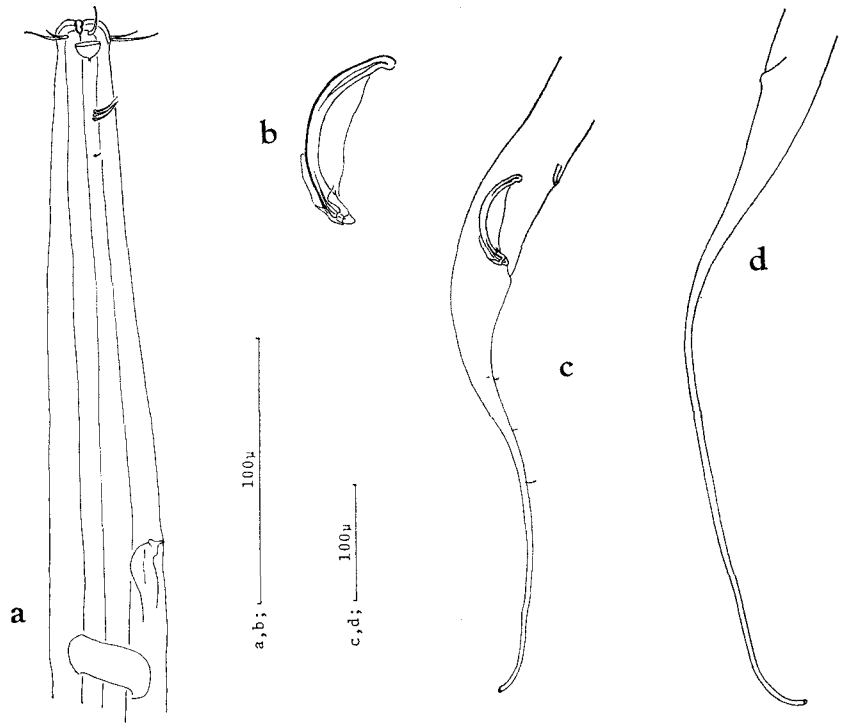

Fig. 2. *Anticoma trichura* Cobb, 1898. Specimen from Hatake-jima. a: Anterior region of male. b: Spicule. c: Tail of female.

Description. Measurements are in Table 2.

Cuticle smooth except in the post-cloacal ventral region of males. Amphids 7–8.5 μ wide (about 1/3 of head diameter). Oesophagus slender. Cervical setae are characteristic: males with three long ones and a posterior short one, females with four long one close together. Nerve ring and excretory pore lie at about 45% and 35% of the oesophagus length from anterior end respectively. Tail slender, 6.4–7.4 times of cloacal diameter (males) or 11.7–11.9 times of anal diameter (females). The precloacal supplement just in front of the proximal end of spicule. Spicules long (1.7–1.8 times of cloacal diameter), proximally bent, dorsal and ventral contours nearly parallel, laterl line inconspicuous in the middle part. Velum present, but its surface smooth. Ovaries paired, unequal, opposed and reflexed at 13.7–14.9% and 26.0–29.0% of body length anterior and posterior to vulva respectively. One egg (133–145 $\times$ 80–82 μm) was observed in uterus of each specimen.

Diagnostic Characters. Excretory pore a short distance in front of nerve ring. Supplement opens anterior to proximal end of spicule. Amphids 1/3 to 1/4 of cephalic diameter wide.

Distribution. Australia (Cobb 1898); Indonesia (Micoletzky 1930); Antarctic, Subantarctic (Mawson 1958, Allgén 1959); Maldive Islands (Gerlach 1962); Florida (Wieser & Hopper 1967); Bermuda (Coull 1968); Tanabe Bay.

Remarks. As can be seen from Table 3 (comparisons with the original and other descriptions), *A. trichura* shows not a little variation. And my specimens show great affinities to those described by Micoletzky from Indonesia. As for the number of cervical setae, the fourth setae of males are very minute, and it is possible they were ignored. So the present specimens are described as *A. trichura* for the present, in respect that their amphids are 1/3 of the head diameter wide.

Table 2. Measurements of *Anticoma trichura*

	♂1	♂2	♂3	♀1	♀2
L	4.24	4.36	4.46	4.82	5.26
eso	.579	.630	.591	.615	.640
hd	.024	.022	.023	.023	.023
bd	.065	.074	.063	.077	.080
ad	.055	.054	.051	.047	.051
vd				.088	.086
mbd	.075	.087	.073		
cs	.022	.019	.022	.021	.021
cerv. 1	.044	.039	.037	.040	.037
cerv. 4	.052	.057	.056		
nr	.266	.286	.268	.273	.289
ep	.190	.222	.222	.221	.225
t	.389	.345	.375	.558	.597
spic	.094	.096	.094		
gub	.033	.034	.037		
sup	.017	.015	.017		
s, c	.077	.080	.080		
V				1.92	2.00
a	56.5	50.1	61.1	54.7	61.2
b	7.3	6.9	7.5	7.8	8.2
c	10.9	12.6	11.9	8.6	8.8
Vu (%)				39.8	37.9

Table 3. Comparisons of *Anticoma trichura*

	Cobb, 1898 Australia	Micoletzky, 1930 Indonesia		Gerlach, 1962 Maldives	Wieser & Hopper, 1967 Florida	Present specimens Shirahama	
	(♀)	(♂)	(♀)	(♂)		(♂)	(♀)
Body length (mm)	3.51	3.88	4.00	2.6-3.5	3.01-3.04	4.24-4.46	4.82-5.26
a	41.7	47	38	33-45	about 60?	50.1-61.1	54.7-61.2
b	7.5	6.2	7.1	5.9-6.2		6.9-7.5	7.8-8.2
c	4.5	10.2?	6.65	5.1-7.7		10.9-12.6	8.6-8.8
Vu (%)	39		44.5				37.9-39.8
Tail length divided by anal diameter	13.75			7.5-12.1	14(♂) 18(♀)	6.4-7.4	11.7-11.9

Anticoma elegans sp. nov.

(Fig. 3)

Specimens Examined. 8 males and 8 females from north shore of S.M.B.L.; fine sand in 2 m water. Type specimens are deposited in S.M.B.L.

Description. Measurements are in Table 4 and 5.

Cuticle smooth. Head with a circle of ten cephalic setae (6+4) of almost same length. Five cervical setae present on lateral sides. Excretory pore opens anterior to cervical setae (about twice as far from anterior end as amphids). Terminal excretory duct long. Oesophagus slender and without conspicuous bulb. Nerve ring a little anterior to the middle of oesophagus. Tail slender, 6.1–7.0 times of cloacal diameter (males) or 7.8–9.2 times of anal diameter (females). A simple pre-cloacal supplement opens anterior to the proximal end of the spicule. Spicule slender and arched ventrally as usual. Thin velum present. Gubernaculum weakly developed. Ovaries paired, almost equal, opposed and reflexed at 11.4–16.7% and 11.4–14.8% of the body length anterior and posterior to vulva, with eggs (96–105 × 38–53 μm).

Diagnostic Characters. The excretory pore half as far from anterior end as cervical setae. The number of cervical setae five. De Man's ratio a between 40 and 55. Spicule with velum and proximally broadened middle line.

Remarks. It seems that the taxonomical positions of *A. acuminata* (Eberth, 1863) and related species are still in confusion. The present species much resembles *A. acuminata* described by Wieser (1953), but differs from the latter in the much slender body (i.e. de Man's ratio a exceeds 40), and the shape of spicules is characteristic.

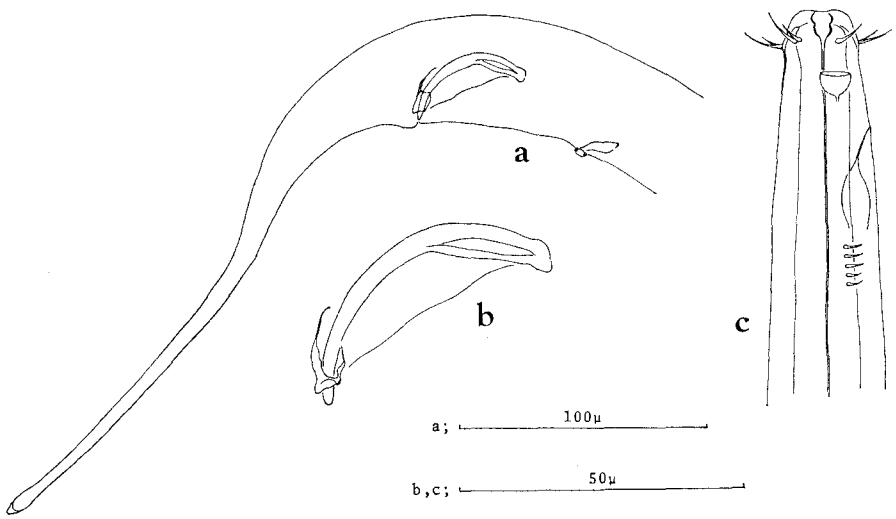

Fig. 3. *Anticoma elegans* sp. nov. Holotype specimen. a: Tail of male. b: Spicule. c: Head of male.

Table 4. Measurements of *Anticoma elegans* (males)

	♂1	♂2	♂3	♂4	♂5	♂6	♂7	♂8
L	2.24	2.41	2.43	2.54	2.61	2.64	2.68	2.78
eso	.446	.430	.426	.455	.468	.475	.474	.487
hd	.013	.013	.013	.013	.014	.013	.013	.015
bd	.043	.046	.043	.047	.045	.048	.047	.048
ad	.036	.038	.036	.038	.038	.041	.039	.038
mbd	.049	.051	.051	.051	.053	.056	.051	.055
cs	.007	.008	.009	.008	.008	.009	.009	.008
am	.011		.011	.010	.012	.011	.012	.011
cerv. 1	.043	.046	.039	.042	.041	.040	.041	.046
nr	.209	.213	.214	.214	.218	.226	.230	.235
ep	.022		.019	.022	.020	.019	.021	.022
t	.248	.243	.246	.232	.250	.249	.249	.265
spic	.053	.054	.051	.053	.058	.053	.050	.059
gub	.015		.020	.018	.018	.018	(.014)	.018
sup	.014	.014	.016	.018	.017	.016	.017	.016
s, c	.068	.067	.064	.069	.071	.066	.068	.068
a	45.7	47.3	47.5	49.8	49.2	47.1	52.5	50.5
b	5.0	5.6	5.7	5.6	5.6	5.6	5.7	5.7
c	9.0	9.9	9.9	10.9	10.4	10.6	10.8	10.5

Table 5. Measurements of *Anticoma elegans* (females)

	♀1	♀2	♀3	♀4	♀5	♀6	♀7	♀8
L	2.40	2.42	2.44	2.45	2.55	2.63	2.67	2.82
eso	.455	.440	.435	.435	.455	.470	.472	.470
hd	.013		.013	.014	.013	.014	.014	.014
bd	.046	.043	.046		.051	.057	.050	.049
ad	.034	.032	.034	.035	.035	.035	.037	.038
vd	.054	.051	.059	.054	.056	.062	.059	.059
cs	.009		.007	.007	.008	.008	.008	.008
am			.009	.010	.011	.011	.012	.014
cerv. 1	.048		.040	.044	.042	.049	.047	.044
nr	.214	.206	.212	.212	.220	.214	.235	.226
ep	.024		.020	.021	.021	.024	.023	.022
t	.296	.287	.313	.287	.298	.302	.293	.298
V	1.15	1.19	1.18	1.23	1.23	1.24	1.30	1.29
a	44.4	47.5	41.4	45.4	45.4	42.4	45.3	47.8
b	5.3	5.5	5.6	5.6	5.6	5.6	5.7	6.0
c	8.1	8.4	7.8	8.5	8.5	8.7	9.1	9.5
Vu (%)	47.8	49.0	48.5	50.2	48.3	47.0	48.5	45.7

Family Enoplidae

Enoplus michaelseni (Linstow, 1896)

(Fig. 4)

Syn. *E. atratus* Linstow, 1896

Samples Examined. 3 males and 7 females from north shore of S.M.B.L.; weed and associated sand in the tidal zone.

Description. Measurements in Table 6.

Body tapers slightly to the anterior end; body diameter at the base of oesophgus is 1.40–1.67 times of that at the level of eyes. Cuticle smooth and thick. The head typical with three lips. Length of mandibles is 45.7–57.7% of head diameter. Amphids open anterior to the posterior edge of the cephalic capsule. Masses of lateral pigment are present near the anterior end of the oesophagus. Oesophagus cylindrical. Nerve ring and excretory pore at about 45% and 38% of the oesophagus length from anterior end respectively. Terminal excretory duct short. Tail relatively long (2.3–2.6 times of cloacal diameter in males or 3.1–3.8 times of anal diameter in females) with a pair of terminal setae. Males with two pairs of stout setae on the posterior lip of the cloacal opening, and with a pair on the anterior lip. Long setae present on the subventral sides between openings of supplement and of cloaca. Spicules long (1.8 times of cloacal diameter long), inflated proximally and pointed distally, and provided with 6–8 semi-circular plates. Vulva opens slightly posterior to the middle of body. Ovaries paired, equal, opposed and reflexed at about 20% of the body length anterior and posterior to vulva. No eggs were observed in uteri.

Diagnostic Characters. Amphids lie anterior to the posterior edge of cephalic

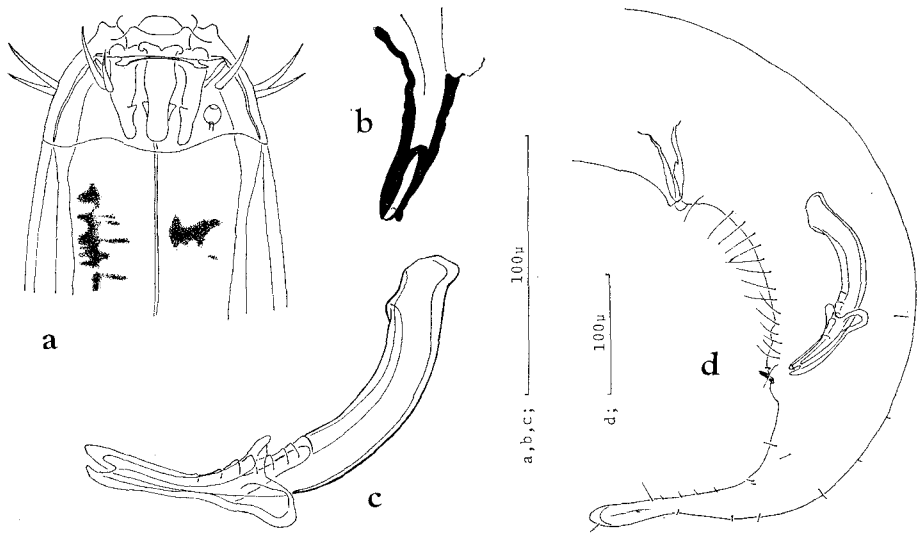

Fig. 4. *Enoplus michaelseni* (Linstow, 1896). Specimen from Tanabe Bay. a: Head of male. b: Pre-cloacal supplement. c: Spicule. d: Tail of male.

Table 6. Measurements of *Enoplus michaelseni*

	♂1	♂2	♂3	♀1	♀2	♀3	♀4	♀5	♀6	♀7
L	3.36	4.47	4.80	3.96	4.05	4.05	4.09	4.39	4.57	5.38
eso	.672	.774	.760	.756	.732	.772	.776	.821	.813	.906
hd	.063	.069	.076	.073	.060	.067	.071	.073	.070	.073
bd	.124	.126	.149	.129	.155	.129	.146	.129	.130	.142
ad	.098	.105	.103	.087	.102	.088	.088	.086	.089	.098
vd				.150	.186	.146	.153	.156	.146	.166
mbd	.133	.141	.176							
cs	.022	.025	.025	.027	.028	.026	.029	.027	.025	.030
mandl	.033	.035	.036	.037	.033	.035	.041	.038	.032	.037
nr	.322	.330	.356	.345	.334	.363	.338	.369	.334	.388
ep	.254	.290	.303	.302	.288	.289	.265	.302	.297	
t	.229	.276	.260	.292	.309	.302	.298	.326	.299	.346
spic	.174	.192	.190							
gub	.074	.084	.085							
s, c	.213	.282	.282							
V				2.21	2.16	2.28	2.29	2.28	2.48	2.99
a	25.2	31.7	27.2	26.4	21.8	27,8	26.7	28.1	31.3	32.4
b	5.0	5.8	6.3	5.2	5.5	5.3	5.3	5.3	5.6	5.9
c	14.7	16.2	18.4	13.6	13.1	13.4	13.7	13.5	15.3	15.5
Vu (%)				55.9	54.7	56.2	56.1	51.9	54.2	55.6

capsule. Excretory pore a little anterior to nerve ring. Spicule with 6–8 semicircular plates. Lateral piece of gubernaculum has characteristic two processes. Pre-cloacal supplement trumpet-shaped.

Distribution. Fuegian Archipelago (Linstow 1896, de Man 1904); Falkland Islands (Baylis 1916); Chile (Wieser 1953); Mediterranean (Wieser 1956); Kerguelen Islands, Macquarie Islands (Mawson 1958); Argentina (Allgén 1959); South Africa (Inglis 1964); Tanabe Bay.

Remarks. E. michaelseni can be distinguished from *E. communis*, very common species in Europe, by the following characters. The body tapers to a less degree to the anterior end; body diameter at the base of oesophagus is 1.3–1.7 times of that at the level of eyes (2 times in *E. communis*). Characteristic gubernacular prolongation present. And the mandibles are longer (by Wieser, 1953; 37–48μ and 55–60% against 32–36μ and 40–50%). With the former two characters, the present specimens were identified as *E. michaelseni* in spite of their somewhat smaller mandibles.

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